LOVE WAVES AS AN EXPLOSION-EARTHQUAKE DISCRIMINANT

HUEI-YUIN WEN, B.S.

DIGEST

Earthquakes can be discriminated from under-
ground nuclear explosions by using the plots of body-
wave magnitude (m_b) versus surface-wave magnitude (M_S).
The surface-wave magnitude can be based upon either
Rayleigh waves or Love waves. Nine Eurasian events
with anomalously low Rayleigh-wave magnitudes and four-
teen Kashmir earthquakes from a mainshock-aftershock
sequence, all of which occurred during the year 1972,
have been further studied using Love waves. In gener-
al, the fundamental-mode Love-wave magnitudes (M_S^L) are
higher than the corresponding Rayleigh-wave magnitudes
(M_S^{RZ}), allowing us to reclassify some of the anomalous
events as non-anomalous earthquakes. By employing both
m_b : M_S^{RZ} and M_S^{RZ} : M_S^L criteria, the number of anomalous
earthquakes is reduced down to six, with none found in
Kashmir. The amplitude determination in the frequency
domain appears to give a more reliable measurement of
the size of an earthquake than the M_S value. In addi-
tion, anomalous events can be identified by the ratio
of the amplitude spectra levels of the fundamental-
mode Love waves at 20-sec and 40-sec period ($A_S^L(20)/
A_S^L(40)$). By this criterion only four events whose

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Love-wave spectral shapes are different from those of the other earthquakes and whose Love-wave magnitudes are anomalously low are considered to be anomalous earthquakes, although there is possibly a fifth anomalous event, whose Love waves were too small to permit a spectral analysis. Therefore, Love waves may serve as an additional useful discriminant between earthquakes and underground explosions.